PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 7039DI.CHII	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/BE2005/000042	International filing date *(day/month/year)* 29.03.2005	Priority date *(day/month/year)* 26.03.2004
International Patent Classification (IPC) or national classification and IPC INV. B41F17/00		
Applicant DE VOLDER, Laurent		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 9 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
24.10.2005	30.06.2006
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Curt, D Telephone No. +31 70 340-4383

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/BE2005/000042

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-10	as originally filed

Claims, Numbers

1-24	filed with telefax on 15.06.2006

Drawings, Sheets

1/4-4/4	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-24
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-24
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-24
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: WO 92/05960 A (PRINTING INTERNATIONAL NAAMLOZE VENNOOTSCHAP) 16 April 1992 (1992-04-16)

D2: US-A-4 803 922 (DENNESEN ET AL) 14 February 1989 (1989-02-14)

D3: US-A-5 119 724 (NG ET AL) 9 June 1992 (1992-06-09)

1. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and shows (the references in parentheses applying to this document) a device for linear pad printing products with significant variations between them (see for instance page 1, first and third paragraph) by means of a linear pad comprising -one pad (see figure 9) with a primary guide (implicit, see page 3, fifth paragraph) provided for the main movement of the pad, which provides for a movement function The subject-matter of claim 1 differs from this known linear pad printing device in that said device comprises:
-one secondary guide as a buffer element for buffering the differences in effective deposit depth between the individual products to be printed, wherein
-said secondary guide is arranged axially with respect to said pad and outwardly thereto so as to act thereon.

The problem to be solved may be considered as the provision of a linear pad printing device which enable to compensate for variations in height of the products to be printed.
The present solution to this problem is neither known from the prior art, neither are there any hints so as to come to a product such as disclosed in claim 1.
D1 intends to print on objects of irregular shapes by providing a flexible pad (see in particular figure 9)
D2 and D3 shows pad printing device, one of which (in D2) print on circular shape products.
Therefore the subject-matter of claim 1 is considered inventive (Article 33(3) PCT)

2. Independant claim 12 describes a known method for linear pad printing using a pad with the features of claim 1.
Therefore claim 12 is considered inventive (Article 33(3) PCT).

3. Claim 2-11, respectively 13-24 are dependent on claim 1, respectively on claim 12 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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adjusted to a lower than optimum setting for a variable set of product parameters. The nature and gravity of the product quality damage depends on the product in question. It can be considerable, in particular for products such as confectionery, sugared almonds, chocolates and pharmaceutical tablets, which then inevitably leads to great product waste, up to inadmissible levels.

In the case of the abovementioned known conventional machines for printing products by means of linear pad printing the limitations in the case of significant product variations between the production series are summarized below.

The machine parameters such as image size, position of the image relative to the product, printing parameters of the ink, including medium, pigment, drying time, adhesion etc., and the size and shape of the pad, its hardness, the uptake depth on the cliché and the deposit depth on the product are in each case set for a set of products.

In addition, during the setting of the parameters of the machine, account can be taken of only slight deviations of the products and/or of the inaccuracies in the positioning of the product relative to the printing unit. In the case of a conventional pad printing machine it is not possible to adapt the machine parameters to the effective individual characteristics of the product such as shape, size, color, surface characteristics etc. All this results in a reduction in the average product quality in the case of products with considerable product variations between them, as a result of product damage, in particular deformation as a result of a too great pressure force on the product, on the one hand, and loss in quality of the printing as regards image, position, intensity and color(s), inter alia, on the other hand.

Eliminating these abovementioned limitations calls for a technological solution that cannot be reached in devices that employ the conventional method of pad printing.

Likewise WO 92/05960 A discloses a printing tampon having the same shortcoming as indicated above consisting of being applicable for printing objects with only slight deviations such as small differences in size, e.g. in the case of eggs, in particular series of eggs. The objects disclosed may only slightly vary in size. The tampon as disclosed which is provided for achieving this has a weakening which may consist in a joint part, e.g. a coil spring, arranged between the top part of the tampon and the tampon tip respectively. Besides, this document discloses a piece holder consisting in a container, more particularly the ordinary

packaging container of the objects to be printed. Consequently, said piece holder is no part of the printing device as such and it is therefore not suitable for being used in the overall printing process of products having more substantial size variations.

Object of the invention

The main object of the invention is to eliminate the above-mentioned drawbacks including avoiding damage to the quality of the end product during printing. To this end, one or more of the following measures must be taken as a solution to the problems and shortcomings of the existing systems, depending on the degree of product variation and the specific individual character of the products to be printed.

Summary of the invention

According to the invention, an adapted printing unit of the type defined in the main claim is therefore proposed, wherein the pressure on the products to be printed is limited in the case of products with significant product variations between them, thanks to said device.

Thanks to the specific arrangement of the secondary guide acting on the printing pad outwardly therefrom, an outstanding buffering of the differences in effective deposit depth between the individual products to be printed is achieved.

In particular, the following advantages are present compared with the existing devices. According to the invention, a printing device that is adapted to the type of product – partly flexible, but also brittle – is proposed. The device for the pad movement comprises in particular a set of elements that form, respectively in pairs, a double guide with, on the one hand, a primary conventional guide by means of which the main movement of the pad is carried out and, on the other hand, an additional secondary guide for buffering the differences in effective deposit depth between the individual products. This is an essential aspect of the system according to the invention.

Thanks to this specific combination provided in the device according to the invention for the pad movement, consisting of primary elements with a movement function and secondary elements with a buffer function, the pressure force on the product to be printed can be reduced and allowances are made for

significant variations in the dimensions of the product. This means that the quality of the products can be guaranteed and a high capacity can be obtained by printing a number of items - with significant variations between them - per printing cycle.

According to a special embodiment of the device according to the invention, the abovementioned secondary elements are formed by elastic elements, preferably of the spring type, which are disposed axially relative to the movement axis of the pad.

According to a preferred embodiment of the invention, said device further comprises an adapted piece holder for the products to be printed, wherein the position and orientation of each product relative to the printing unit is brought into line with the one, which is necessary for printing the image at the envisaged position on the product. This means that undesirable friction between product and environment is reduced as much as possible, or even eliminated.

Significant product variations can also be compensated for partly by the abovementioned piece holder. The main advantages of the piece holder, as indicated according to a possible arrangement of it, are the avoidance of local pressure points on the products, during infeed, conveyance, printing and discharge, this being where there are significant variations in the dimensions of the products. The product can also be prevented from undergoing friction as a result of stationary parts during conveyance, which can give rise to product damage.

According to an additional preferred embodiment of the invention, conditioning of the product and the environment is proposed, in this case the piece holder for the product, with regard to temperature, pressure, humidity etc., in order to eliminate product damage arising from not conditioning the environment.

According to a further preferred embodiment of the invention, conditioning of the substance to be printed on the product, such as ink, chocolate and the like, with regard to, inter alia, temperature, viscosity and color, is proposed, in order to keep the print quality constant in this way.

According to yet another preferred embodiment of the invention, an adapted device is proposed for the infeed of the product to and discharge of the product from the printing machine, with guarantee of product quality being retained. The fact is that the more fragile the product to be printed, the more complex the infeed and discharge mechanisms will be.

In the abovementioned first case of so-called natural product variations in a particular product series the device according to the invention offers a solution to the printing of the products with the retention of consistent product quality. In the

abovementioned second case of possible variations between series of products to be printed with the same machine, the device according to the invention offers a solution that drastically reduces the setting time of the machine and thereby also makes it economically practicable to print small series with significant variation between the products.

Special features of this device are the possibility of integration in automatic or manual machines. The device can also be used for printing these products with several colors and/or on several sides.

Specific embodiments of the device according to the invention are defined in further sub-claims.

The entirety of the claimed features, taken alone or in combination with each other, results in a set of devices that allow products with significant product variations, in particular pharmaceutical tablets and edible products, including chocolate, chocolates and sugared almonds, to be printed in several colors and/or on several sides of the product without loss of product quality. Specific care is always taken here to ensure that the quality of the end product remains guaranteed. Quality in the broad sense is then determined by the retained quality of the product and the quality of the monochrome or multicolor printing, applied on one side or on several sides of the product.

According to an additional device for the printing device, the conventional solid pad is replaced by a hollow pad. The shape of the pad and of the hollows, specifically for a particular product and image to be printed, result in a reduction of the pressure force on the product to be printed. This addition is all the more important in the case of great product variations, in combination with a large printed image or otherwise, and the characteristics of the product with regard to deformation.

A combination of the two techniques, double guide and use of hollow pads, can be used for certain combinations of products and printed images. Moreover, these both devices permit simultaneous printing of several products with significant variations between them.

This device can also be used for certain cases, in combination with one or more of the previous devices or otherwise, as a solution designed to compensate for product variations.

This invention also relates to a method for printing the abovementioned products by means of pad printing, in particular by means of a device according to this invention.

The method according to the invention therefore compensates for significant product variations by dividing up more specifically the printing cycle per se. After the specific measurement of the variable product parameter(s), for example dimensions and shape of the product, the settings of the printing unit are adapted in accordance with the measured characteristics. The individual parameters to be set comprise the uptake depth and deposit depth and also the shape and the effective hardness of the pad. By this method, optimum printing is obtained on an individual product basis.

Further features and characteristics of the method according to the invention will be defined in the additional sub-claims.

Further details and particulars of the invention will hereafter be explained with reference to the description hereafter of an exemplary embodiment of the device according to the invention by means of the appended drawings.

AMENDED CLAIMS

1. A device for *linear pad* printing products with significant variations between them by means of a *linear* pad, comprising at least one pad with a primary guide (25,...,85) provided for the main movement of the pad (24,...,84), which provides for a movement function, characterized in that *said device comprises* at least one secondary guide (26,...,86; 27,...,87) as buffer element for buffering the differences in effective deposit depth between the individual products to be printed (23,...,83), *wherein said at least one secondary guide is arranged axially with respect to said pad (24,...,84) and outwardly thereto so as to act thereon (24,...,84).*

2. A device according to claim 1, characterized in that said at least one secondary guide is provided for buffering the differences in effective deposit depth between a plurality of individual products to be printed (23,...,83) which consist of confectionery, including sugared almonds and chocolates, and/or pharmaceutical tablets selectively and/or individual fragile products including porcelain ware.

3. A device according to claim 1 or 2, characterized in that each said secondary buffer element is formed by elastic elements (26, ..., 86), preferably of the spring type, which are arranged substantially axially relative to the movement axis of the pad.

4. A device according to one of the preceding claims, characterized in that *it comprises* a piece holder *(12,...,72) for receiving* the products to be printed, wherein said piece holder is provided with apertures (53') provided therefore, wherein the products to be printed (23, ..., 53, ... 83) can be taken up, wherein the position and the orientation of the product relative to the printing unit can be brought in correspondence with the one which is necessary for printing the image at the appropriate position on the product.

5. A device according to one of the preceding claims, characterized in that said at least one pad (24) is solid.

6. A device according to one of the claims 1 to 4, characterized in that said at least one pad (34, 44) is hollow.

7. A device according to one of the preceding claims, characterized in that *it comprises* a set of multiple printing pads for each primary guide in said device by means whereof various products can be printed simultaneously with the buffering action of said secondary buffer elements (26,..., 86; 27,..., 87).

8. A device according to one of the preceding claims, characterized in that *it comprises* for each printing unit a set of primary and respectively secondary elements, which are arranged by respective pairs, wherein said secondary elements (26, ..., 86; 27,..., 87) are each connected directly to a corresponding pad (24,..., 84) and which are disposed according to the movement axis thereof.

9. A device according to one of the preceding claims, characterized in that it is integrated in an automatic or manual machine selectively.

10. A device according to one of the preceding claims, characterized in that it is provided with printing means for printing products with various colors.

11. A device according to one of the preceding claims, characterized in that it is provided with printing means for printing products on various sides thereof.

12. A method for *linear pad* printing products with significant variations between them by means of a pad, wherein printing material is applied on a cliché according to a determined pattern, characterized in that a pad (24,...,84) and a cliché (21,...,81) are brought in mutual contact (B) from a rest position (A) by means of a primary guide (25, ...,85), wherein the printing material is taken up by the pad of the cliché, and in that when taking up said printing material, the additional secondary guide (26,...86; 27,...,87) buffers the contact between the pad and the cliché, after which the pad is moved in a deposit position (C), wherein the image taken up by the pad is deposited on the product to be printed (23,...,83), wherein said secondary guide elements *axially* buffer the contact between the pad and the products to be printed and after which said pad is moved back to its rest position (A).

13. A method for printing products with mutual significant variations, by means of a pad, possibly according to the preceding claim, wherein printing material is applied

on a cliché according to a determined pattern, characterized in that the parameters of the products to be printed are measured previously, such as in particular the dimensions of the products.

14. A method according to claim 12 or 13, characterized in that said at least one secondary guide buffers the differences in effective deposit depth between a plurality of individual products to be printed (23,...,83) which consist of confectionery including sugared almonds and chocolates and/or pharmaceutical tablets selectively and/or individual fragile products including porcelain ware.

15. A method according to one of the claims 12 to 14, characterized in that it is performed by means of a device according to one of the claims 1 to 11.

16. A method according to one of the claims 12 to 15, characterized in that a plurality of products (23,...,83) are printed substantially simultaneously.

17. A method according to one of the claims 12 to 16, characterized in that the printing parameters of the printing unit are adapted to the requirements on the basis of the measured parameters by means of a processing unit provided therefor, which establishes the link between the measured parameters and the related printing parameters for the printing unit.

18. A method according to one of the claims 13 to 17, characterized in that said product parameters are measured by means of an automated system on the basis of cameras provided therefor.

19. A method according to one of the claims 12 to 18, characterized in that the products (23,...,83) are checked after printing by means of a control system provided therefor, wherein the printed product (23,...,83) as such and/or the printing itself are checked.

20. A method according to one of the claims 12 to 19, characterized in that the taking up and deposit depth, and the shape and the effective hardness of the pad are set individually as parameters, wherein an optimum printing is carried out on an individual product basis.

21. A method according to one of the claims 12 to 20, characterized in that conditioning of the product (23,...,83) to be printed in the environment is proposed, in particular the piece holder, with regard to conditioning parameters, such as temperature, pressure and humidity.

22. A method according to one of the claims 12 to 21, characterized in that conditioning of the substance to be printed, such as ink, chocolate, and the like is proposed with regard to the conditioning parameters of temperature, viscosity and color in order to keep the printing quality substantially constant.

23. A method according to one of the claims 12 to 22, characterized in that the printing of the product (23,...,83) is carried out by means of a plurality of colors.

24. A method according to one of the claims 12 to 23, characterized in that the printing of the product (23,...,83) is carried out on a plurality of sides thereof.